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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,082	04/28/2005	Stefan Bitterlich	270624US0PCT	2316
22850 7590 01/15/2008 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER CHEUNG, WILLIAM K	
			ART UNIT 1796	PAPER NUMBER
			NOTIFICATION DATE 01/15/2008	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/533,082

Applicant(s)

BITTERLICH ET AL.

Examiner

William K. Cheung

Art Unit

1796

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Request for Continued Examination

1. The request filed on November 26, 2007 for a Request for Continued Examination (RCE) under 37 CFR 1.53(d) based on parent Application No. 10/533,082 is acceptable and a RCE has been established. An action on the RCE follows. Claims 1-10 are pending.
2. In view of the amendment and argument filed November 26, 2007, the rejection of Claims 1-10 under 35 U.S.C. 112, second paragraph, is withdrawn.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
4. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pierotti et al. (US 6,440,885 B1) as evident in Harmer et al. (US 2004/0072672) in view of Rath (US 5,910,550) for the reasons adequately set forth from paragraph 6 of the office action of June 26, 2007.

Regarding claims 1-10, Pierotti et al. disclose a zeolite membrane (claim 1) and the use thereof for separating a mixture of mixed butenes to produce n-butene (col. 7, line 61, and col. 8, line 33). The mixture of butenes as disclosed in Pierotti et al. (col. 7, line 61, and col. 8, line 33) are considered to contain both linear and branched butene compounds because n-butene is a linear compound and the other butenes would be considered branched because their carbons are not arranged in a linear fashion.

Regarding claims 2-3, Pierotti et al. (col. 16, claim 4) clearly teach a zeolite membrane comprising zeolite MFI type. Further, the examiner has a reasonable basis that the said zeolite composition is believed to inherently possess the molecular sieve properties because zeolites are the aluminosilicate members of the family of microporous solids known as "molecular sieves".

Regarding claim 4 which claims that "the pressure on the side of the membrane on which the C₄ starting stream is disposed is greater than the pressure on the side of the I-C₄ fraction", applicants must recognize that the Pierotti et al. (col. 7, line 65 to col. 8, line 16) clearly indicate that the feed streams supply the C₄ starting stream to the membrane to result the separation of linear or n-butene on the other side of the membrane. Since the feedstreams are required to be under a pressure in order to move or flow partially into the membrane or through the membrane to the other side of the membrane, the examiner has a reasonable basis that the pressure of the feedstream side of the membrane is higher than the other side of the membrane in order for the feedstreams to partially flow through the membrane.

Regarding claim 5, the "mixed butenes" teachings of Pierotti et al. (col. 7, line 61, and col. 8, line 33) clearly encompass any concentration of "mixed butenes" in the feedstreams.

Regarding claim 6, Pierotti et al. (col. 7, line 1-26) disclose feedstocks comprises light components and naphtha components resulted from petrochemical refinery process. Therefore, the examiner has a reasonable basis that feedstreams of Pierotti et al. comprises hydrocarbon to a steam cracking or FCC process. Regarding the claimed "freeing raffinate I of catalyst poison by treating with absorbent materials", the examiner believes that such limitation is considered obvious because such minor variation in a

refinery process is within the teaching scope of petrochemical refinery process teachings in Pierotti et al. (col. 7, line 1-26).

Further, as evident in Harmer et al., Harmer et al. (page 2, 0027, 0029) disclose the use of organic-inorganic polymer microcomposites capable of the isomerization of an olefin. Harmer et al. (page 3, 0039; page 5, 0057) disclose that the inorganic component of the microcomposites disclosed is aluminosilicates (which fundamentally is substantially identical to the composition of zeolite or molecular sieve materials of Pierotti et al.) Harmer et al. (pages 20-21, example 58) clearly indicate that the isomerization of n-butene would result in a mixture of butenes, including isobutene, and oligomers. Therefore, as evident in Harmer et al., the process of Pierotti et al. can also facilitate the isomerization reaction and oligomerization of butenes during separation, in view of the substantially identical composition of the membrane employed for the disclosed process of Pierotti et al. and the composition as disclosed in Harmer et al. Therefore, as evident in Harmer et al., the process of Pierotti et al. clearly can lead to the formation of oligomers and isobutene as by-products.

Regarding claim 10, which claims "removing butanes from the 1-C₄ fraction prior to oligomerizing the olefinic hydrocarbon compounds having 4 carbon atoms", Pierotti et al. (col. 7, line 61; col. 8, line 33) disclose that the feedstock of Pierotti et al. are compositions derived from a composition from a refinery process which inherently comprises butanes (col. 7, line 1-26). Therefore, in view of the difference between the

"mixed butenes" and the composition where the "mixed butenes" are derived from, the examiner has a reasonable basis that the butanes in the mixed butenes have been removed.

The difference between claims 1-10 and Pierotti et al. is that Pierotti et al. are also silent on a subsequent step C that would lead to other products.

Since Pierotti et al. (col. 7, line 61, and col. 8, line 33) clearly disclose the isolation of butene, which is monomer, it would have been apparent to one of ordinary skill in art in the polymerization field to recognize that butene is monomer that can be used to prepare polybutene. When Rath discloses step (c3) of the present invention, namely polymerization of isobutene to polyisobutylene (see D5, claim I), it would have been obvious to one of ordinary skill in art to incorporate the polymerization teachings of Rath to the end of the process teachings of Pierotti et al. to obtain the invention of claims 1-10, with the motivation by the expectation of success of preparing a polyisobutene (abstract), especially after reading both the disclosures to Pierotti et al. and Rath. In view of the 112 rejection set forth, the rationale for the instant rejection is adequate.

Response to Arguments

5. Applicant's arguments filed November 26, 2007 have been fully considered but they are not persuasive. Applicants argue that Rath does not teach a step of "separating

the C4 starting stream into a fraction consisting mainly of linear hydrocarbon compounds having 4 carbon atoms (l-C4 fraction) and a fraction consisting mainly of branched hydrocarbon compounds having 4 carbon atoms (b-C4 fraction). However, the examiner disagrees because Pierotti et al. (col. 7, line 62) clearly disclose the separation of the n-butene from mixed butenes. Since matters do not just disappear, the examiner has a reasonable basis that Pierotti et al. (col. 7, line 62) clearly disclose the separated species (linear n-butenes) and the non-linear (branched) mixed butenes.

Feedstock	Separated Molecular Species	35
Mixed xylenes (ortho, para, meta) and ethylbenzene	Paraxylene	
Mixture of hydrogen, H ₂ S, and ammonia	Hydrogen	
Mixture of normal and isobutanes	Normal butane	
Mixture of normal and isobutanes	Normal butene	40
Kerosene containing C ₉ to C ₁₈ normal paraffins	C ₉ to C ₁₈ normal paraffins	
Mixture of nitrogen and oxygen	Nitrogen (or oxygen)	
Mixture of hydrogen and methane	Hydrogen	
Mixture of hydrogen, ethane, and ethylene	Hydrogen and/or ethylene	45
H ₂ , propane and propylene	Hydrogen and/or propylene	
Coker naphtha containing C ₄ to C ₁₀ normal olefins and paraffins	C ₄ to C ₁₀ normal olefins and paraffins	
Methane and ethane mixtures containing argon, helium, neon, or nitrogen	Helium, neon, and/or argon	50
Intermediate reactor catalytic reformer products containing hydrogen and/or light gases	Hydrogen, and/or light gases (C ₁ -C ₇)	
Fluid catalytic cracking products containing H ₂ and/or light gases	Hydrogen, and/or light gases	
Naphtha containing C ₃ to C ₁₀ normal paraffins	C ₃ to C ₁₀ normal paraffins	
Light coker gas oil containing C ₉ to C ₁₈ normal olefins and paraffins	C ₉ to C ₁₈ normal olefins and paraffins	55
Mixture of normal and isopentanes	Normal pentane	
Mixture of normal and isopentanes	Normal pentane	
Mixture of ammonia, hydrogen, and nitrogen	Hydrogen and nitrogen	
Mixture of A10 (10 carbon) aromatics	e.g. Paradiethylbenzene (PDEB)	60
Mixed butenes	n-Butenes	
Sulfur and/or nitrogen compounds	H ₂ S and/or NH ₃	
Mixtures containing Benzene (Toluene)	Benzene	

Regarding applicants' argument that oligomerization and polymerization are not equivalent, applicants fail to recognize that oligomerization is still a polymerization process, which is to produce low molecular polymers or oligomers.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William K. Cheung whose telephone number is (571) 272-1097. The examiner can normally be reached on Monday-Friday 9:00AM to 2:00PM; 4:00PM to 8:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David WU can be reached on (571) 272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Application/Control Number:
10/533,082
Art Unit: 1796

Page 9

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William K. Cheung, Ph. D.

Primary Examiner

December 31, 2007

WILLIAM K. CHEUNG
PRIMARY EXAMINER